



STUDY OF THE DIVERSITY OF ODONATA IN NARMADA BASIN AT BARWANI DISTRICT (M.P.)

Anita Solanki

Assistant Professor of Zoology, Government P.G. College, MHOW, Devi Ahilya university Indore, MP, India

ABSTRACT

The River Narmada is holy river, which is the fifth-largest river in India that flows east to west. Second, Odonata is a possible biocontrol agent of numerous invertebrates. Biodiversity protection and conservation is a national and international agenda and responsible for sustainable development of a region or a country. Odonata assemblage along with river Narmada region of district Barwani has been investigated from January 2020 to December 2020. A total of 31 species have been distributed in two suborders Zygoptera with 15 species and Anisoptera with 16 species were sampled. In order Odonata, Libellulidae with 17 species is the most dominating family among dragonflies and Coenagrionidae with 12 species among damselflies while others have fewer representatives. Mostly organism were aggregated due to habitat specific nature and random distribution indicates availability of resource utilization to serve but, in the urban forest area high anthropogenic disturbances were observed which create high biotic pressure on forest. A detailed list of odonata recorded from urban forest area as well as valley area is presented.

KEYWORDS: Odonata, Species, Diversity, River Narmada, Ecological Indicator, Barwani Region

INTRODUCTION

The biological change that environmental degradation brings about and enumerated pollution and introduced species as the main cause for the decreased in biodiversity around the world. Relating patterns of biodiversity to spatial phenomena is becoming increasingly important in community ecology and related disciplines such as conservation biology (Spencer et al., 2002) alternatively, local Environmental conditions may prevail because certain species depend on a given set of environmental conditions for survival. Both of these processes are likely to act in concert to determine patterns of community similarity within and among habitats. Partitioning ecological variation exhibited by communities into that explained by purely spatial and that explained by purely environmental phenomena is crucial to understanding the mechanisms behind patterns of biodiversity (Condit et al., 2002, Duivenvoorden et al. 2002).

Vane Wright et al., (1991) also classified a hierarchical composition of different level of organization as well as groups of taxonomically related species to test the patterns of biodiversity conservation. The use of indicator taxa in conservation efforts from pollution control to biodiversity has been the focus of attention (Landers et al., 1988).

Ecological indicators can be defined as a taxon or community that reflects the biotic or abiotic state of an environment (Hodkinson and Jackson, 2005). Larval Odonata diversity and abundance was positively correlated with macro invertebrates diversity and abundance and it was efficient bioindicator of intactness and diversity of overall macro invertebrates (Foote and Rice, 2005).

The river Narmada is the third holy and fifth longest river of

India and the biggest west flowing river of the state of Madhya Pradesh River Narmada basin is about 1288 km. long and 80 km broad lies between east longitude 72°32' and 81°45' and north latitude 21°20'. River Narmada covers large areas in the state of Madhya Pradesh (Armitage, 2012). It is lotic water-body of central plateau region which covers 98,797 sq. km of total watershed area. It is known as the life line of Madhya Pradesh as well as Gujarat. Perennial river system with different habitat types provides good opportunities to Odonata, the wonderful insect groups to flourish and survive. Narmada basin in the Jabalpur region created an excellent habitat and source of alteration for many faunal species like insects, reptiles, birds and mammals (Tiple et al., 2010). Odonata is good indicator of environmental changes as their larvae and adult both are sensitive to habitat degradation and climate changes (Kunte, 2000).

especially in mountain areas (Oppel, 2005) as mountains do not provide only a greater contemporary diversity of habitats, but also a greater potential for survival in refugia.

It is highly specialized insect order shows total metamorphosis and passes through various stages such as egg, larva, pupa and adult stage. Among the invertebrates, Odonata include insects known as dragonflies or damselflies and are always attract the human beings for their, powerful flight, extraordinary sense of vision and variety of colours.

Silspy, (2001) described about 6000 species of dragonflies and Schorr and Paulson, (2014) documented both the dragonflies and damselflies, about 5,952 species and subspecies of Odonata belonging to 652 genera world-wide in all over the world. At present, the Indian subcontinent hosts 3 sub orders, 17 families, 139 genera and 499 species and subspecies of Odonata (Prasad

and Varshney, 1995). Mitra (2005) recorded 499 and later on 463 species were confirmed by Subramanian, (2009) till date. Odonata fauna from some protected areas of Madhya Pradesh such as 24 species in Pench National Park and 11 species in Satpura National Park (Ramkrishna et al., 2006), 46 species in Kanha National Park (Raju and Narayanan, 2008) 32 species in Bandhavgar Tiger Reserve (Mishra, 2009, 14 species Pachmarhi Biosphere Reserve (Prasad and Mishra, 2009) and 26 species in Singhori wildlife sanctuary (Taimale, 2011). Here we provide a comprehensive account of the diversity of Odonates of the Narmada Basin Jabalpur region based on fresh field studies and past records.

Study Area

Present study area is located near Barwani city the findings presented here are based on random surveys carried out January 2019 to December 2019 in Barwani region of river Narmada. Barwani is located between Latitude 22°10,60"N and Longitude 74° 54', 0"E. The study area of river Narmada basin is surrounded with a very large variety of trees, mini forest, vast grassland and small hill: these are the elements for architecting a preferred habitat or such species.

1. Rajghat: Rajghat is located between 22.0759° N, latitude and 74.8881° E longitude. It is about 05 km from city Barwani.
2. Bhadal: Bhadal is a small town situated at the bank of River Narmada. Geographically it is located between 22.0033°N, latitude and 74.4350°E longitude.

MATERIAL AND METHOD

Data Collection:

The sites were visited early in the morning from 5 to 9 am, and evening from 5 to 7 pm hours to note maximum possible species of dragonflies and damselflies to record their activities. The study has been carried out in such way that there should be at least one visit in a week. Observations were made through walking in a wide area of the site with the aid of binocular and digital cameras.

Data Treatment, Analysis and Identification:

Organisms were primarily identified directly in the field by observation and the difficult cases followed capture or photography of the organism. In critical conditions, specimens were collected only with handheld aerial sweep nets Each specimen was placed in a plastic bottle and carried to the laboratory for further identification with the help of a field guide (Wynter-Blyth, 1957 and Kunte, 2000). In the present study, all scientific names of odonata were followed varsheny, (1983) guidelines. The observed dragonflies and damselflies were categorized in four categories on the basis of their abundance in Gwarighat region of river Narmada i.e., Very common, common, rare, very rare (Tiple et al., 2008).

OBSERVATION

The present study was started to examine the diversity of dragonflies and damselflies form surrounding of river Narmada in rajghat near Barwani region. 31 observed species were

tabulated family wise.

Table 1: The observed species of Odonata and their Relative Status in rajghat near Barwani district around river Narmada basin.

S.No.	Name of Species	Common Name	Status
Order : odonata			
Sub order : Zygoptera (damselflies) 15			
Family : Coenagrionoidae (11)			
1	Aciagrion occidentale (laidlaw, 1919)	Splende dartlet	Very Rare
2	Agriocnemis femina (Brauer, 1868)	White-backed Wisp	Common
3	Agriocnemis pieris (Laidlaw, 1919)	White Durtlet	Rare
4	Agriocnemis pygmaea (Rambur, 1842)	Pygmy Dartlet	Very Commun
5	Agriocnemis splendidissima (Laidlaw, 1919)	Splendid dartlet	Common
6	Ceriagrion coromandelianum (Fabricius, 1798)	Coromandel Marsh Dart	Rare
7	Ischnura aurora (Brauer, 1868)	Golden Dartlet	Common
8	Ischnura nursei (Maxton, 1907)	Pixie Dartlet	Very Common
9	Ischnura senegalensis (Rambur, 1842)	Senegal Golden Dartlet	Very Common
10	Pseudagrion decorum (Rambur, 1842)	Elegant Sprite	Commun
11	Pseudagrion rubriceps (Selys, 1876)	Saffron Faced Blue Durt	Very Commun
Family : Platynemididae (1 Species)			
12	Copera marginipes (Rambur, 1842)	Yellow Bosh Dart	Common
Family: (Lestidae 2species)			
13	Lustes elatus (Hagen in selys, 1862)	Emerald spreadwing	Rare
14	Lestes viridulus (Rambur, 1842)	Emerald spreadwing	Rare
Family: Chlorocyphidae (1 species)			
15	Libellago lineataindica (Fraser, 1928)	Golden Gem	Rare
Sub-order: Anisoptera (Dragonflies) (16)			
family: Aeshnidae (2 species)			
16	Anax guttatus (Burmeister, 1839)	Pale Spotted Emperor	Very Common
17	Anax immaculiformis (Rambur, 1942)	Blue darner	Rare
Family: Gomphidae (1 species)			
18	Paragomphus Lineatus (Selys, 1850)	Lined Hooktail	Common
Family: Libellulidae (13 species)			

19	<i>Bradinopyga geminata</i> (Rambur, 1842)	Granite Ghost	Rare
20	<i>Crocothemis servilia</i> (Drury, 1770)	Scarlet Skimmer	Very Common
21	<i>Diplacodes trivialis</i> (Rambur, 1842)	Blue-Ground Skimmer	Common
22	<i>Diplacodes nebulosa</i> (Fabricius 1793) -	Ground Skimmer	Rare
23	<i>Neurothemis tullis</i> (Drury 1773)	Pied Paddy Skimmer	Very Rare
24	<i>Orthetrum pruinosana</i> (Rameister, 1839)	Slender Skimmer	Very Common
25	<i>Orthetrum Sabina</i> (Drury, 1773)	Small Skimmer	Very Rare
26	<i>Pantala flavescens</i> (Fabricius, 1798)	Common Picture Wing	Rare
27	<i>Potamarcha congener</i> (Rumbur, 1842)	Ashy skimmer	Rare
28	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	Coral Tailed Cloud-wing	Rare
29	<i>Tholymis tillarga</i> (Fabricius, 1798)	Coral-tailed cloudwing	Rare
30	<i>Trithemis aurora</i> (Burmeister, 1839)	Crimson Mars Glider	Very Rare
31	<i>Trithemis festiva</i> (Rambur, 1842)	Black stream glider	Very Common

Table 1

RESULTS AND DISCUSSION

Diversity

The odonata specimens were categorized into four groups based on their occurrence during the study period on the basis of frequency of sightings. During the intensive survey of odonata in Barwani district. 31 species were revealed among these a total of 7 families belonging to order Odonata recorded from selected sites. A total of 31 species of order Odonata, where suborder Zygoptera have 15 species under 4 families out of which Coenagrionoidae with 11 species is consisting of maximum number of species followed by Chlorocyphidae. 1 Platynemidi, 1 and Lestiae with 2 species each while Anisoptera were comprise of 16 species under 3 families out of which Libellulidae or Skimmers are the most diverse and dominating family of dragonflies with 13 species that was followed by others such as Aeshnidae with 2 species and Gomphidae with 1 species (Figure 1).

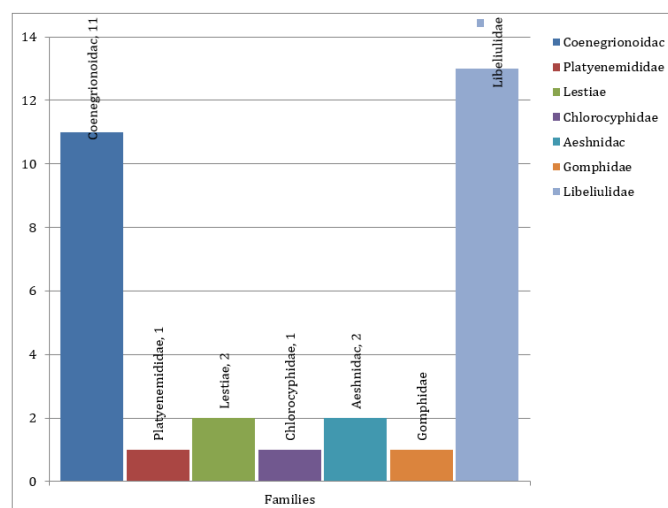


Figure 1: Families distribution of Odonata in Barwani region of river Narmada

Figure 2: These 38% species of Odonata from the study area were designated rare and 8% species as very rare, suggesting the need for strict conservation.

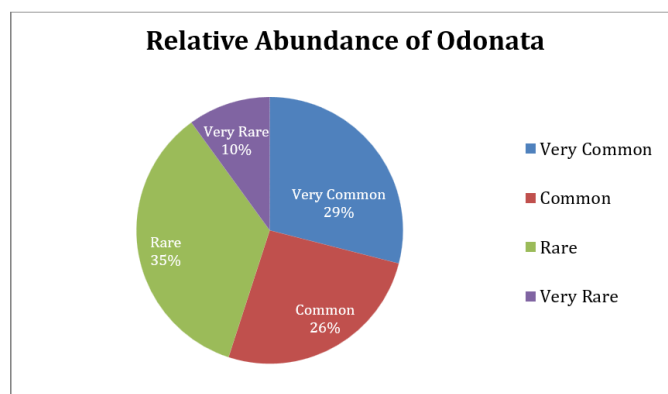


Figure 2. Relative Abundance of Odonat

Sharma and Shukla, (2015) reported total 25 species of Odonata in southeast region of river Narmada during Januar 2015 to August 2015 where Libellulidae family was the most diverse with 10 species than Coenagrionoidae with 7 species but in further study of that same site 5 more species i.e. 30 species were found from Jabalpur region an highlighted the presence of pollution. They revealed the relative abundance among 25 species Odonates. Similarly in present study the numbers of rare species (15) were generally high Odonata ore biological indicators as their species composition and abundance changed in response to human disturbance.

Bhandari et al. (2015) studied the diversity of Odonata of river Sone in the surroundings of Bansagar Dam and revealed 22 species of Odonata from the catchment of reservoir. Subramanian, (2009) reported 11 dragonfly families, of which 972 species with Libellulidae and 958 species with Gomphidae are major families throughout the world followed by 436 species in Aeshnidae, 249 species in Corduliidae and 123 species in Macromiidae. Tijare and Patil, (2012) were observed 21 species of dragonflies from Nagpur district and Libellulidae family has

high species richness. Urbanization also is associated with habita degradation incialing decreased plant species diversity, reduced water quality and increased air and soil pollutions. In terrestrial ecosystem, insect fauna represent more than 70% and also play an important role in food chain for the natural balance. Insects are extremely important components and bio-indicators in the world.

They further demonstrated that most of the species were noticeably absent in the disturbed and human impacted sites (gardens, plantation and grassland) and there was no occurrence of unique species in moderately disturbed areas comparable to those of less disturbed wild areas. The present study site is in constant disturbance due to the cutting of grasses, shrubs and trees for landscaping which may be the reason for the overall reduction of the number of species. The rich diversity of Odonata, especially the Libellulidae in Barwani region of river Narmada indicates a varied assemblage of floral species as well as terrestrial area. Dragonflies and dumsellflies serve as an environmental Indicator. Owing to habitat destruction for developmental activities in urban environment and unscientific management of natural resources, much of our native Odonata is fast disappearing and at present, their survival is under threat.

CONCLUSION

Odonata is biotope characterization that shows different types of habits have characteristic species assemblages. With the pressing needs of the growing human population in india, Natural greeneries are being clear-felled giving way to urbanization, pollution and overgrazing. Loss of prime habitat is the major threat to all wildlife including dragonflies and damselflies. Although we cannot completely nullify the ill effects of urbanization and development, we can at least try to reduce them by planting endemic trees and plans supporting the local wildlife. Many species of Odonata as birds, receive much less research and conserving attention. The group features prominently in nature management and they are often used as indicators for environmental health and conservation management. Odonata is insect group that is highly rich in fat and protein and provide essential amino acids which lack in plants and seeds. So they are eaten by birds, fishes, amphibians, reptiles and mammals including human. Large scale and multi-taxa conservation plans for river systems are needed in order to establish a balance between agriculture, development and nature conservation. Development of sustainable network of local experts and volunteers is needed to facilitate the conservation and monitoring of dragonfly and damselfly species and habitats.

REFERENCES

1. Armitage, S. (2012) Water quality assessment of river Narmada at M.P India, American journal of soil and water 2(4):7-9.
2. Bhandari, R. Choubey, V. and Shukla, A. (2015) Diversity and Abundance of Odonata in Catchments of Bansagar Dam, Shahdol (MP) International Journal of Current Research, 7(12): 24034-2-037.
3. Condit, R., Pitman, N. and Leigh. EG. (2002) Beta-diversity in tropical forest trees. Science 295:666-669.
4. Duivenvoorden, JF, Svenning, J.C. and Wright, SJ. (2000) Beta diversity in tropical forests. Science, pp. 636-637
5. Foote A.L. and Rice, C.L. (2005) Odonata as biological indicators Canadian prairie wetlands Ecological Entomology, 30:273-283.
6. Hodkinson, I.D. and Jackson, J. (2005) Terrestrial and aquatic Invertebrates as Bioindicators for environmental Monitoring with Particular Reference to Mountain Ecosystems. Environmental Management, 35(5) 649-666
7. Kunte, K. (2000) Butterflies of Peninsular India. Universities Press (Hyderabad) and Indian Academy of Sciences (Bangalore), pp. 254.
8. Landers, P.B., Verner, J. and Thomas, J.W (1988) Ecological uses of vertebrate indicators species a critiuque Conservation biology. 2.316-328.
9. Manavar, N.A. Rathod, P.P. and Raja, I.A. (2012) Diversity and abundance dragonflies and damselflies of chatri Late Region, in Pohara-Malkhed Reserve Forest, Amravati, Maharashtra (India), International journal of engineering Research and Applications, 2(5): 521-523.
10. Mitra. T.R. (2005) Evolutionary Adaptations in Morphology and Ecology of tholymis tilliard (faricius) and bradino pygageminata (rambur insecta: Odonata) Records of zoological survey of India, 104 (1-2):300.
11. Noss, R.F. (1990) Indicators for monitoring biodiversity: a hierarchical approach conservation biology, 4:355-364
12. Oliver, I and Beattie, A. (1993) A possible method for the rapid assessment of biodiversity Conservation biology 7: 562-568.
13. Oppel, S. (2005) Habitat associations of an Odonata community in a lower montage rainforest in Papua New Guinea international journal of odonatolgy, 8 : 243-257.
14. Prasad M. and Mishra, S.K. (2009) Insect: Odonata, In: fauna of pachmarhi biosphere reserve conservation area series, Zool. Surv. India, 39:203-212.
15. Raju, D.V. and Narayanan, S.P. (2008) Odonata fauna of Kanha National Park area in central India. Fraseria (N.S.), 7: 5-9.
16. Ramesh, T. Hussain, K.J, Satpathy, K.K., Selvanayagam, M. and Prasad, M.V R. (2010) Diversity, distribution and species composition of ants fauna at department of Atomic Energy (DAE) campus kalpakkam, South India World J. Zoology, IDOSI Publication, 5(1): 56-65.
17. Ramkrishna Chandra, K., Nema, D.K., Aluwar, S.C. and Alfred, J.R.B. (2006) faunal Resource of National Parks of Madhya Pradesh and Chhattishgarh. Conservation Area Series, Zool. Surv India 30: 1-123.
18. Schorr. M. and Paulson, D. (2014) World Odonata List. www.pugetsound.edu/academics/academicresources/slatermuses.
19. Sharma, S. and Shukla, A. (2015) Preliminary Study of Odonates in Southeast Region of Narmada Valley, Jabalpur International Journal of Recent Scientific Research, 6(10): 7038-7040.
20. Spencer, M., Schwartz, SS. and Blaustein, L. (2002) Are there fine-scale patterns in community similarity among temporary freshwater pools? Global Ecol. Biogeogr, 11. 71-78.
21. Subramanian K.A. (2009) A Checklist of Odonata of India Zoological Surveda, pp. 36.
22. Talmale S.S. (2011) A Preliminary list of Odonata from the Singhori Wildli sanctuary, Madhya Pradesh. bionotes, 13(4):159-160.
23. Tijare. R.V. and Patil, K.G. (2012). Diversity of Odonets in and around Gorewada National Park, Nagpur M.S. (India) Bionano Frontier, 9: 182-183.
24. Vanwrigh, R.I. Humphries C.J. and Williams P.H. (1991) what to protect? Systematic and the agony of choice Blogical Conservation, 55 : 235-354.
25. Varshney, R.K. (1983) Index Rhopalo ceraindica part II Common names of butterflies from india and neighboring countries, records of the Zoological survey of India, Occasional paper no. 47:1-49.
26. Wilson, K.D. P. (1995) Hong Kong dragonflies. Urban Council.